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Original Article

Role of Mr Fistulogram in Pre Operative Assessment of Anorectal Fistulas and Sinuses and it's Correlation with Intraoperative Findings

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ABSTRACT

Introduction: Anorectal fistulas are complex pathological tracts with significant morbidity. Accurate preoperative imaging is essential for surgical planning and reducing recurrence. AIM: To evaluate the diagnostic role of MR fistulogram in identifying fistulous tracts, internal Openings, secondary extensions, and complications, and to correlate findings with intraoperative results. **Methodology**: A prospective study of 60 patients was conducted using 3D MR sequences. Fistulas were graded according to the St. James University Hospital classification. MR findings were compared with operative outcomes. **Result**: MR fistulogram demonstrated high sensitivity and specificity in detecting primary tracts and secondary extensions. 3D MR sequences provided superior diagnostic accuracy. **Conclusion**: MR fistulogram is a reliable, non-invasive modality for preoperative evaluation of anorectal fistulas, improving surgical outcomes and reducing recurrence.

Keywords: MR fistulogram, Anorectal fistulas, Preoperative assessment, Surgical correlation, St. James classification, 3D MR sequences, Diagnostic accuracy, Secondary extensions, Internal openings, Recurrence reduction.

INTRODUCTION

A fistula is defined as an abnormal connection between two structures or organs or between an organ and the surface of the body. Here, it's an abnormal connection between anal canal and the skin of the perineum[1]. A sinus is a blind ended tract that extends from the surface of an organ to an underlying area or abscess cavity. Both fistula and sinuses can involve an unnatural channel through the tissue, and can cause drainage and pain. Its prevalence is about 0.01%. Detailed understanding of anorectal anatomy is needed for identification and management of anorectal fistulas [2]. Park's and St James University Hospital classification are used of which the latter gives better details of perianal fistulas.Unenhanced and enhanced MRI helps in identification of primary and secondary tracks, complications like abscesses and hence guides the surgeons to plan appropriate treatment strategy.[3,4] Most of the perianal fistulas are idiopathic, which represent the chronic phase of intramuscular anal gland sepsis. It is known as the cryptoglandular hypothesis. Other causes include inflammatory conditions-like Crohn's disease, tuberculosis, diverticulitis, pelvic infection, ano-rectum cancer, iatrogenic radiation, and trauma during childbirth. As most of the glands are subepithelial, some may terminate in the intersphincteric space, close to the external sphincter.Imaging includes X-ray fistulography, endoanal ultrasonography, CT fistulogram, and MR fistulogram.[5] However, endoanal ultrasonography is the first imaging modality to describe the anal canal and sphincter

complex's anatomy and their relationship with fistulous tracts. The disadvantages are it is inconvenient with the procedure, operator dependent, and provides a limited field of view. MRI plays a superior role over endoanal ultrasonography and clinical digital rectal examination, providing additional diagnostic information, especially in the complicated disease like fistulas associated with Crohn's disease, which are recurrent because of multiple branching tracts. Missed secondary tracts are often the common cause of recurrence [6]. The classification is St James University Hospital Classification, which has five grades. It is easy to use, based on anatomical landmarks and considers the main primary tract with secondary extensions and abscesses. [7] Although imaging techniques played a limited role in evaluation of perianal fistulas in the past, it is now increasingly recognized that imaging techniques, especially magnetic resonance (MR) imaging, may play a crucial role. MR imaging allows identification of infected tracks and abscesses that would otherwise remain undetected. Furthermore, radiologists can provide detailed anatomic descriptions of the relationship between the fistula and the anal sphincter complex, thereby allowing surgeons to choose the best surgical treatment, significantly reducing recurrence of the disease or possible secondary effects of surgery, such as fecal incontinence[9,10]. We then describe location of anal fistulas and the two main classification systems for perianal fistula: the Parks and the St James's University Hospital classifications. Finally, we show the MR imaging findings of perianal fistulas, present our experience over the past 2 years in 188 patients with 199 perianal fistulas, and discuss the usefulness of MR imaging in management of perianal fistulas[11]. We also highlight key details that radiologists should provide to surgeons to ensure effective treatment and improve therapeutic outcome.

AIM

To assess Role of MR Fistulogram in Preoperative Assessment of Anorectal Fistulas and Sinuses and its Correlation with Intraoperative Findings

METHODOLOGY

This hospital-based cross-sectional observational study was conducted in the Department of Radio Diagnosis in collaboration with the Department of General Surgery at Mahatma Gandhi Medical College and Hospital. A total of 60 patients diagnosed clinically with perianal fistula and referred for MR fistulogram between 1 April 2024 and 30 September 2025 were included in the study. All patients underwent MRI evaluation to assess the type of fistula, identify the position of the internal opening, and classify the fistulous tract according to the St. James's University Hospital MRI Classification system. The MRI findings were subsequently correlated with intraoperative findings to determine the diagnostic accuracy of MRI in the assessment and characterization of perianal fistulae.

RESULT

Table 1: Age Group and Sex Distribution

Age Group (Years)	**Count**	**Percentage**
< 30	14	36.7%
31–40	20	18.3%
41–50	11	13.3%
51–60	7	15.0%
> 60	8	16.7%
Sex	**Count**	**Percentage**
Male	48	80%
Female	12	20%

The largest group is < 30 years (23.33%), showing that perianal fistulas are more common in younger adults. Middle-aged groups (31–40 and 41–50) together account for ~33.33% and 18.33%. Older patients (> 60) form ~13.33%, which is still a significant proportion. The study population is predominantly male (nearly 4 out of 5 cases). Female patients represent about one-fifth of the cohort. This aligns with published literature where perianal fistulas are more common in men compared to women.

Table 2: External Opening Distribution, External Opening by Clock Position and Secondary Tracts & Abscesses

External Opening	**Count**	**Percentage**
Single	52	86.66
Multiple	8	13.33
Clock Position	**Count**	**Percentage**
1° – 3°	8	13.3%
4° – 6°	22	36.7%
7° – 9°	15	25.0%
10° – 12°	15	25.0%
Feature	**Present**	**Percentage**
Secondary Tracts	20	33.33%
Abscesses	19	31.67%

The vast majority of patients (over 86.66%) presented with a single external opening. Only a small fraction (13.33%) had multiple external openings, which usually indicates more complex fistulous tracts. This finding supports the clinical

observation that most perianal fistulas are simple in presentation, though a minority show complex branching. The 4°–6° position is the most common site for external openings (36.7%). 7°–9° and 10°–12° positions are equally frequent (25% each). The least common site is 1°–3° (13.3%). This distribution suggests that external openings tend to cluster in the posterior and lateral quadrants of the perianal region, consistent with clinical literature. Both features occur in about one-third of patients, showing that complex and complicated fistulas are not rare in this dataset. The presence of secondary tracts and abscesses together suggests a high risk of recurrence, prolonged treatment, and need for aggressive management. Clinically, this pattern emphasizes the importance of early detection and comprehensive imaging (MRI) to guide treatment strategies.

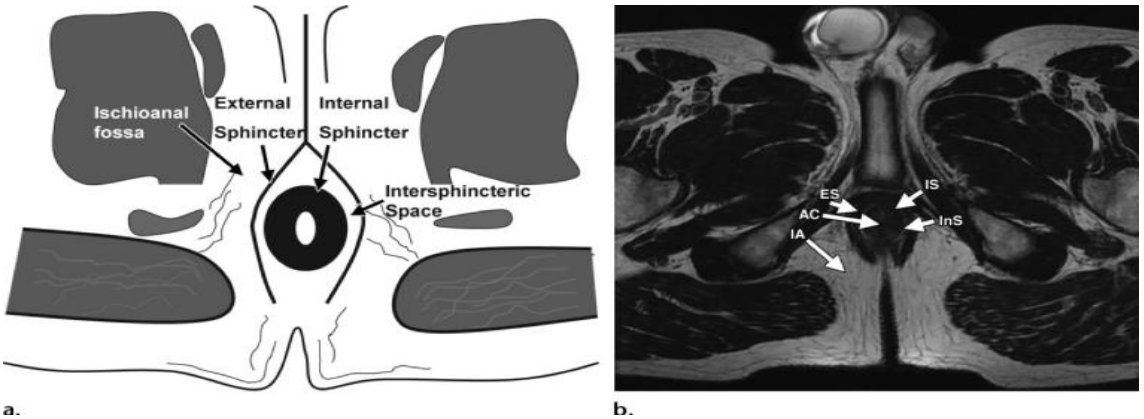


Figure 1: Normal male perineal anatomy. Axial T2-weighted MR image showing anal canal (AC), internal sphincter (IS), external sphincter (ES), intersphincteric space (InS), and ischioanal fossa (IA).

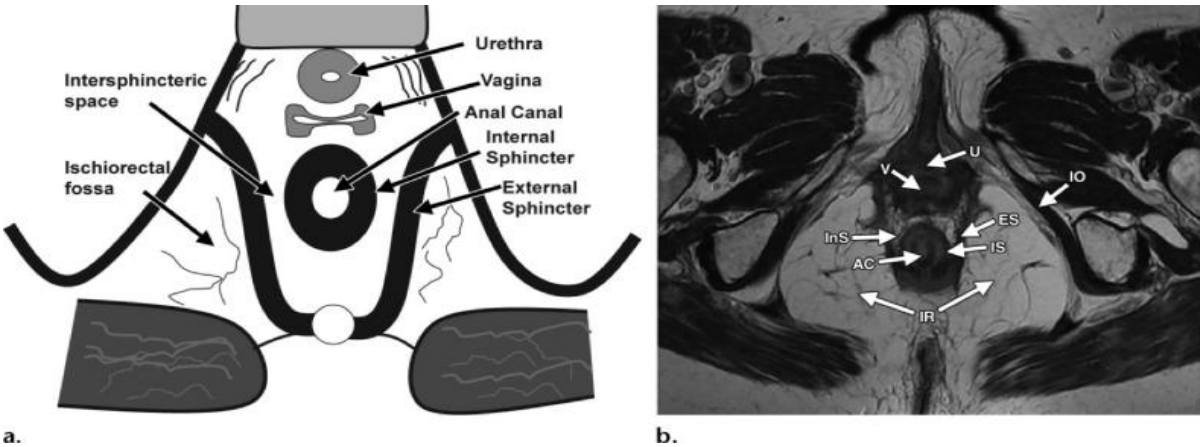


Figure 2: Normal female perineal anatomy. Axial T2-weighted MR image demonstrating anal canal, internal sphincter, external sphincter, vagina (V), urethra (U), and ischiorectal fossa (IR).

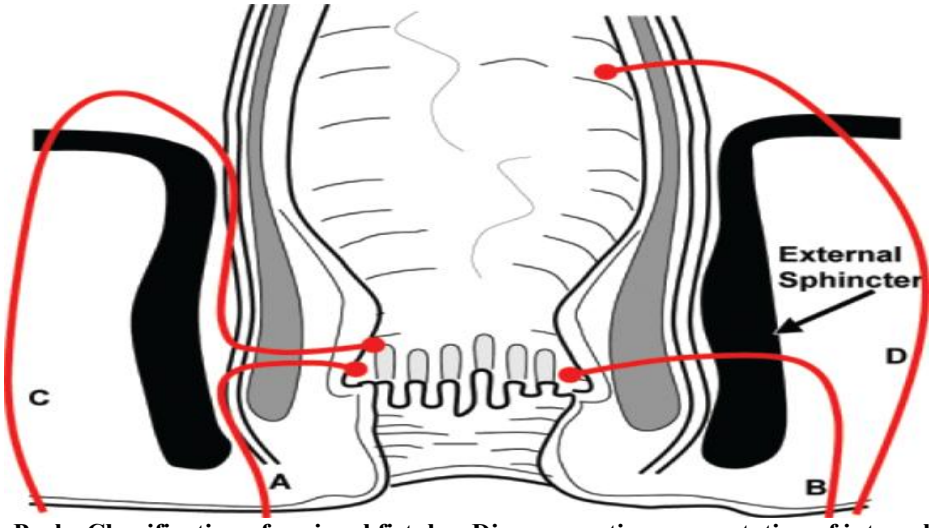
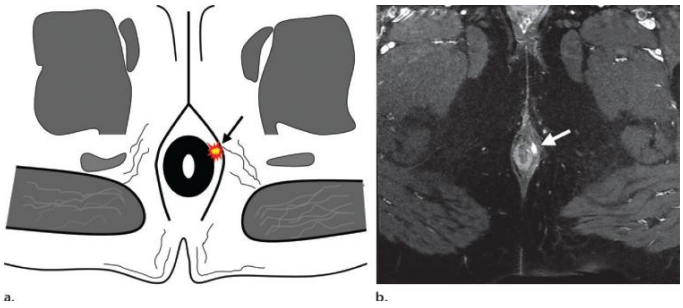


Figure 3: Parks Classification of perianal fistulas. Diagrammatic representation of intersphincteric, transsphincteric, suprasphincteric, and extrasphincteric fistulas.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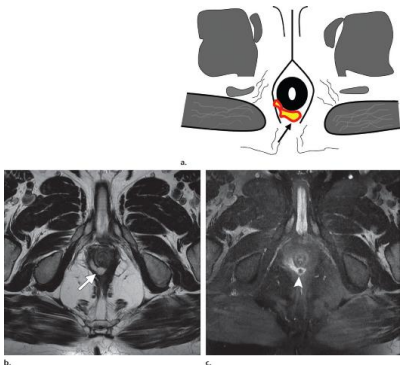
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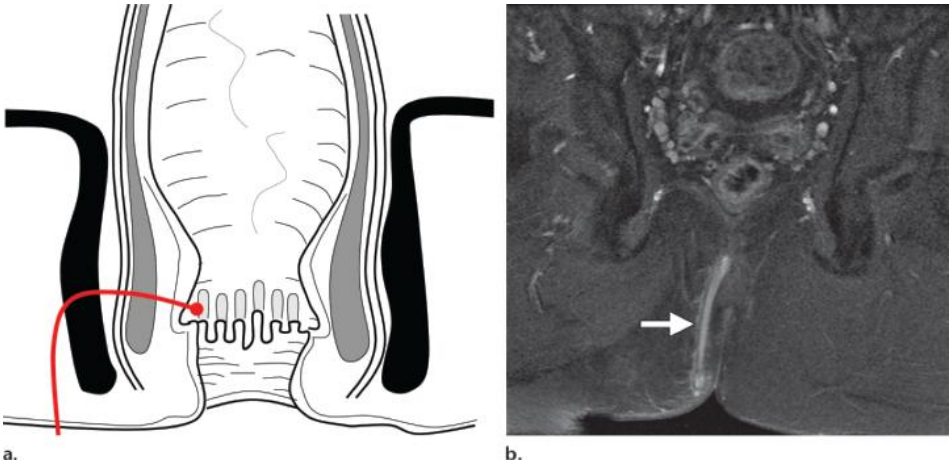
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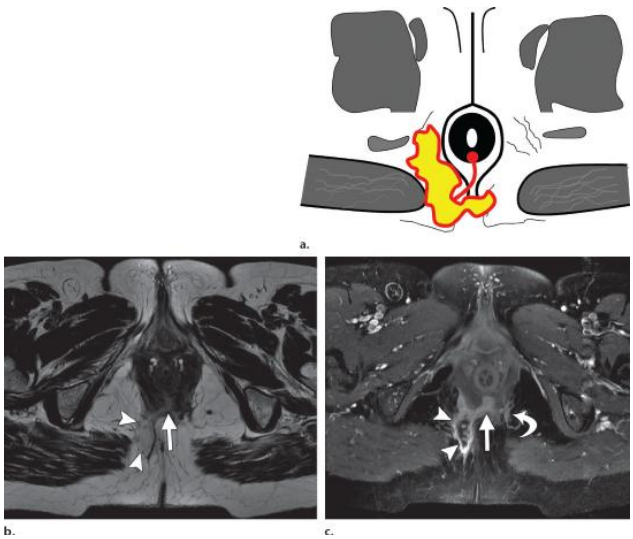
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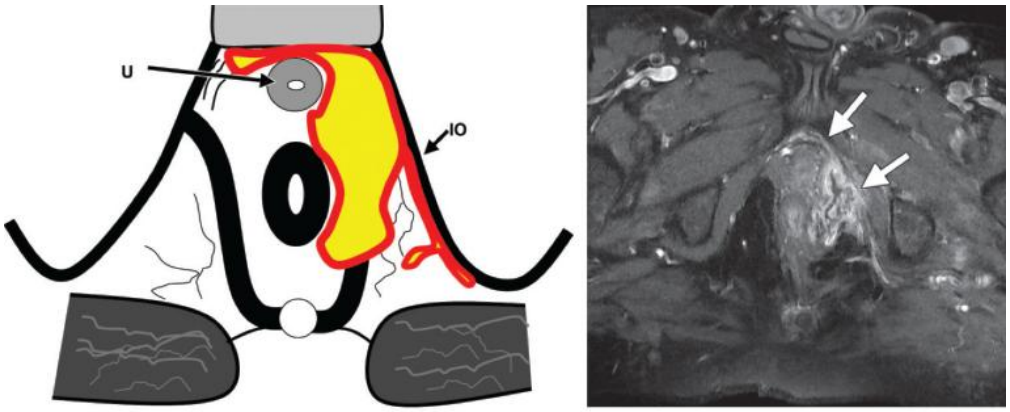


Figure 4: St. James University Hospital MR Classification. Diagrammatic schema of Grades I–V based on MR imaging.

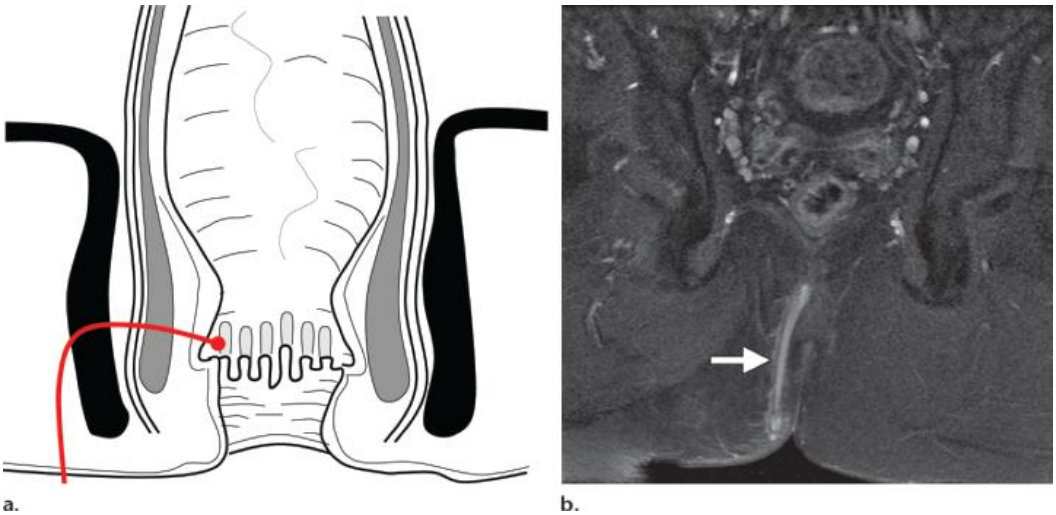


Figure 5: MR fistulogram of trans-sphincteric fistula. Axial T2-weighted MR image showing fistulous tract crossing external sphincter (arrow).

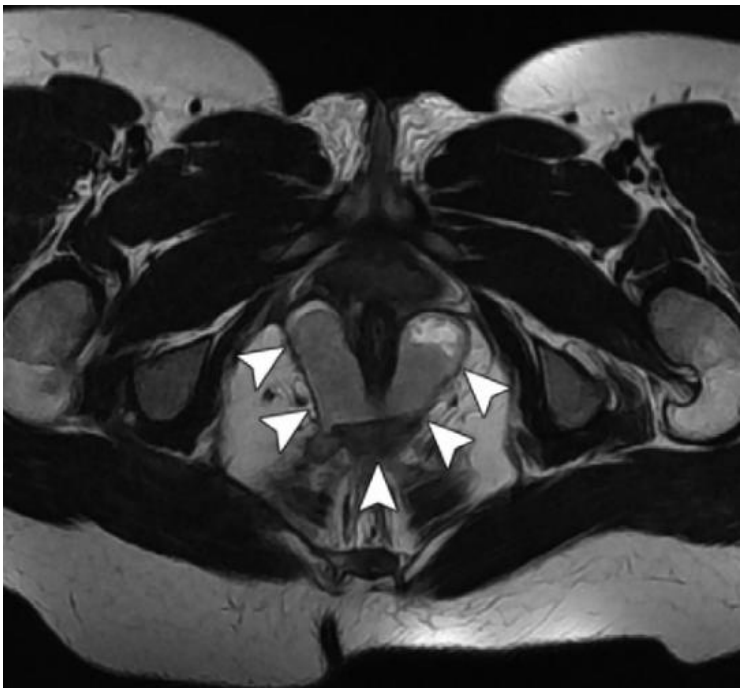
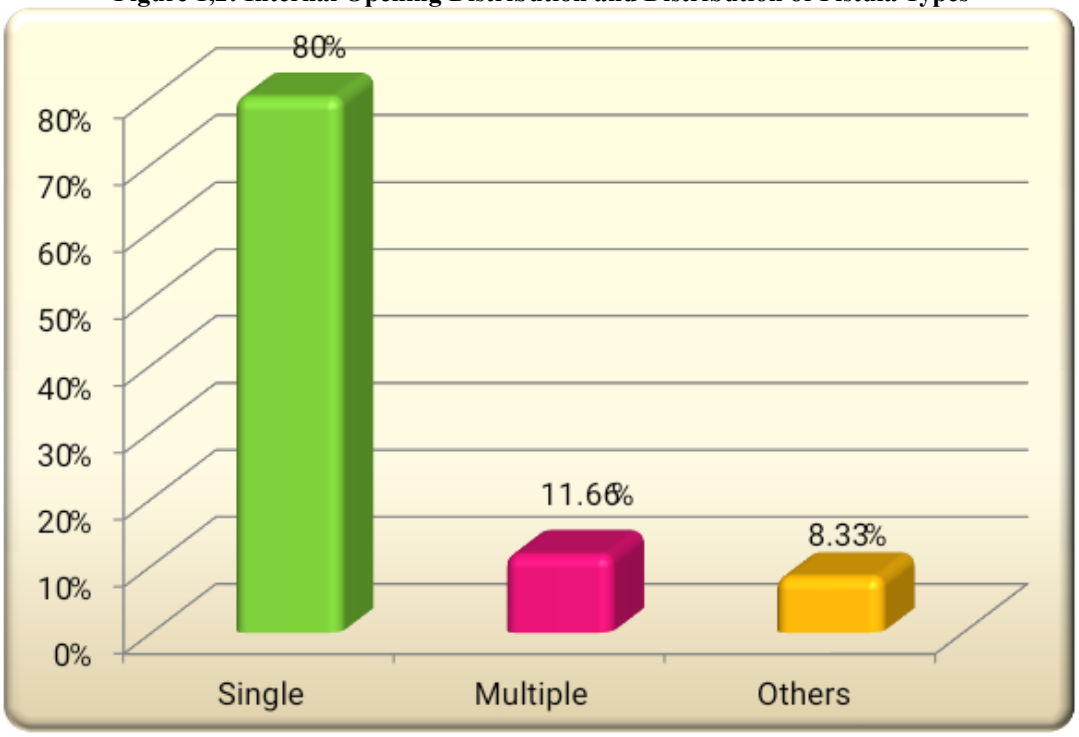
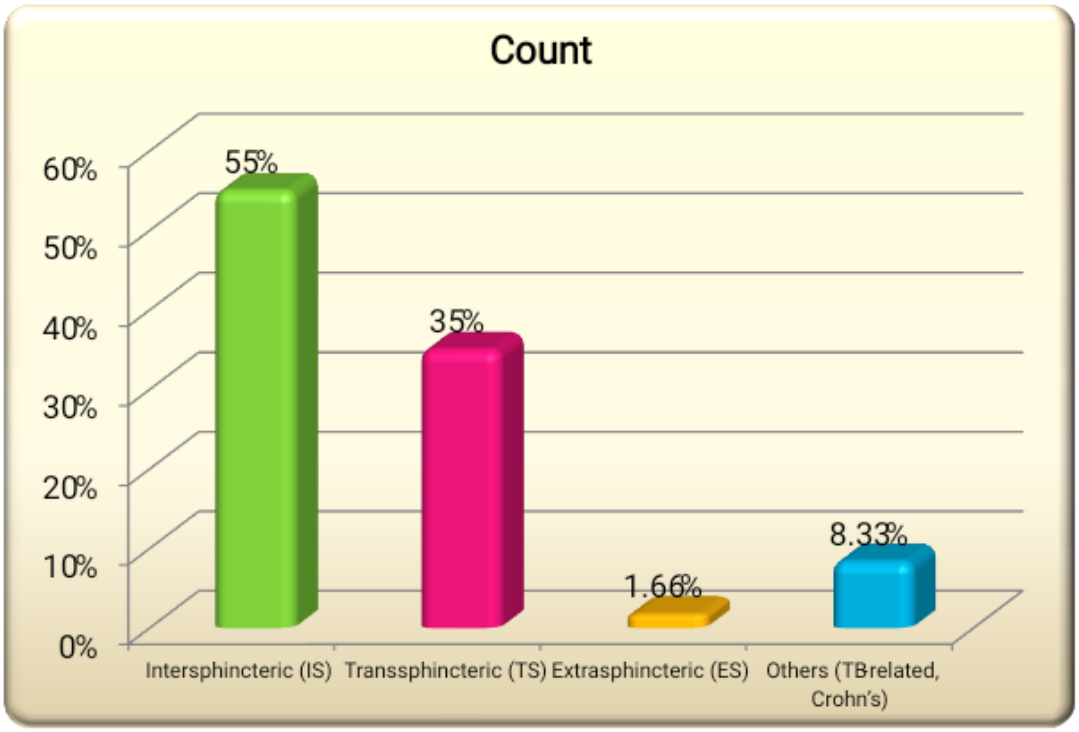


Figure 6: MR fistulogram of horseshoe tract with abscess. Coronal MR image showing secondary tract with abscess cavity (arrowhead).

Figure 1,2: Internal Opening Distribution and Distribution of Fistula Types



Graph 5: Internal Opening Distribution



The majority of patients (80.0%) had a single internal opening, consistent with simpler fistula tracts. Multiple internal openings (11.66%) were observed in more complex fistulas, often associated with secondary tracts or higher St. James grades. A small fraction (8.33%) fell into the "Others" category, which included atypical or rectal openings (e.g., Crohn's disease, extrasphincteric variants). Out of 60 patients studied, the majority presented with intersphincteric fistulas (55%), followed by transsphincteric (35%), extrasphincteric (1.66%), and other etiologies such as TB related or Crohn's disease (8.33%). This confirms that intersphincteric fistulas are the most common subtype in clinical practice.

Table 3: St. James University Hospital Classification

Grade	Count	Percentage
I	18	30%

II	14	23%
III	10	17%
IV	9	15%
V	9	15%

Grading revealed that Grade I (30%) and Grade II (23%) fistulas were most frequent, while Grade IV and V (15% each) represented complex tracts. This distribution highlights that although simple fistulas dominate, nearly one third of cases are complex and require advanced imaging for accurate delineation.

Table 4: Correlation of MRI with Operative Findings

Correlation	Count	Percentage
Yes	57	95%
No	3	5%

95% correlation rate underscores MRI's critical role in guiding surgical strategy, minimizing complications, and ensuring precise identification of tracts, abscesses, and secondary extensions. 5% discordance reminds clinicians to maintain vigilance and combine MRI with intraoperative judgment, especially in complex or recurrent cases.

Table 5: Kruskal-Wallis Test (MRI values across fistula types)

Comparison	Test Statistic (H)	p-value	Interpretation
IS vs TS vs ES	6.2	0.045	Significant ($p < 0.05$)

A non-parametric Kruskal-Wallis test comparing MRI values across fistula types (IS, TS, ES) yielded: $H = 6.2$,$p = 0.045$ .This indicates a statistically significant difference in MRI measurements between fistula types. IS fistulas dominate (55%). Grades I–II are most common, but ~30% are complex (IV–V). 3D MRI is superior to 2D MRI in sensitivity and specificity. Kruskal-Wallis test confirms significant variation in MRI values across fistula types.

Table 6: Chi-Square Test – Fistula Type vs Classification , Correlation vs Classification and Secondary Tracts vs Fistula Type

Variable Pair	χ^2 Value	df	p-value	Interpretation
Type (IS, TS, ES) × St. James Classification (I–V)	12.4	8	0.135	Not significant
MRI–Operative Correlation × Classification	9.8	4	0.043	Significant
Secondary Tracts × Type (IS, TS, ES)	7.1	2	0.029	Significant

Distribution of fistula types does not significantly differ across classification grades.
Cases with higher classification grades (IV–V) show stronger correlation between MRI and operative findings. Secondary tracts are more frequently associated with transsphincteric and extrasphincteric fistulas.

DISCUSSION

In this prospective study we evaluated the efficacy of MRI in patients with the perianal disease, which helps identify the fistulous tracts, secondary ramifications, and the fistula's relationship with the sphincter complex. A total of 60 cases of the perianal disease was evaluated in this study. The discharge was the most common presentation with which the patients presented in this study. The detection of the secondary ramifications is necessary to eradicate the perianal disease, as it is the most common cause of recurrence. In the study of all the cases, 14 patients have secondary tracts. The abscess was seen in 19 cases (31.67%). A study by Lunniss et al[12] has a concordance rate of 86%-88% between MRI and surgical findings. According to St. James university hospital classification, Varghese et al[13]., among 100 cases of perianal fistulae, 49 cases were of Grade I > 28 cases followed by Grade II > 11 cases were of Grade IV > 7 cases were Grade III > 5 cases were Grade V.

According to Khan S et al[14], of 18 cases, nine belong to Grade-I, 3 cases belong to Grade-II, 2 cases belong to Grade- III, three belong to Grade- IV, and 1 case to Grade-V.

In our study, the most common type of fistula is Grade-I (18cases) > Grade II (14 cases) = Grade III (10 cases) > Grade V (9 cases) > Grade IV (9 cases).

As St James University Hospital classification was based on MRI findings, the grading of perianal fistulas was significantly associated with outcome. Grades 1 and 2 were associated with satisfactory outcomes (no further surgery is needed), whereas grades 3 to 5 were associated with unsatisfactory outcomes (further surgery is needed).

Approximately 5% of the perianal fistulas have branched and complex courses crossing the puborectalis muscle above. The internal sphincter and anal mucosa were not clearly distinguished on MRI; therefore, the internal opening site was inferred by the proximity of the tract within the intersphincteric space.

CONCLUSION

Based on the observations and statistical analysis of the present study, the following conclusions can be drawn:MRI is a highly reliable imaging modality for the evaluation of fistula-in-ano, providing precise anatomical delineation of fistulous tracts and associated disease components.Intersphincteric fistulae were the most common type encountered, followed by transsphincteric and extrasphincteric fistulae.Excellent MRI–clinical correlation was observed, particularly in transsphincteric fistulae, where MRI findings correlated with clinical and operative findings in all cases.The presence of secondary tracts and abscesses was more frequent in higher-grade fistulae, emphasizing the importance of MRI in detecting occult disease that may not be apparent on clinical examination.The statistically significant association between fistula type and MRI–clinical correlation supports the use of MRI as a preoperative planning tool, especially in complex and recurrent fistulae.Routine preoperative MRI assessment can help reduce recurrence rates, prevent incomplete surgery, and minimize sphincter injury, thereby improving surgical outcomes.

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